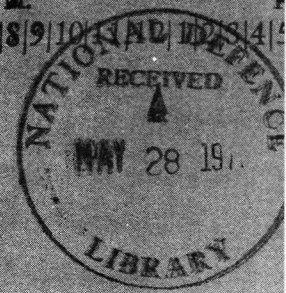


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EXHAUST



"Praise the Lord and Pass the Ammunition"

New Year is traditionally a time to take stock, review the past and plan for the future. Since the time that man Churchill promised us "Nothing but blood, sweat and tears," we have made much progress in the organization and supply of men and materials, also in converting defence to attack to the point where this same greatest man of our times has given us hope that victory might be attained in Europe in 1944.

Wishful thinkers eagerly caught on to that part of his speech but closed their ears to his warning that the bloodiest battles are yet to come, which in the light of sane and balanced thinking means that victory will not be achieved until the last battle is won.

In our lifetime we have all seen many last minute reversals of near victory in sports and other activities. There is an inherent characteristic about we British in that we always fight harder and better when the going is tough. Let us not be fooled into a false sense of security. Let's go all out for victory in 1944, remembering that the Lord helps those who help themselves, and while we now have the ascendancy, it can be reversed if we spend all our time Praising the Lord for victory and forget to Pass the Ammunition.



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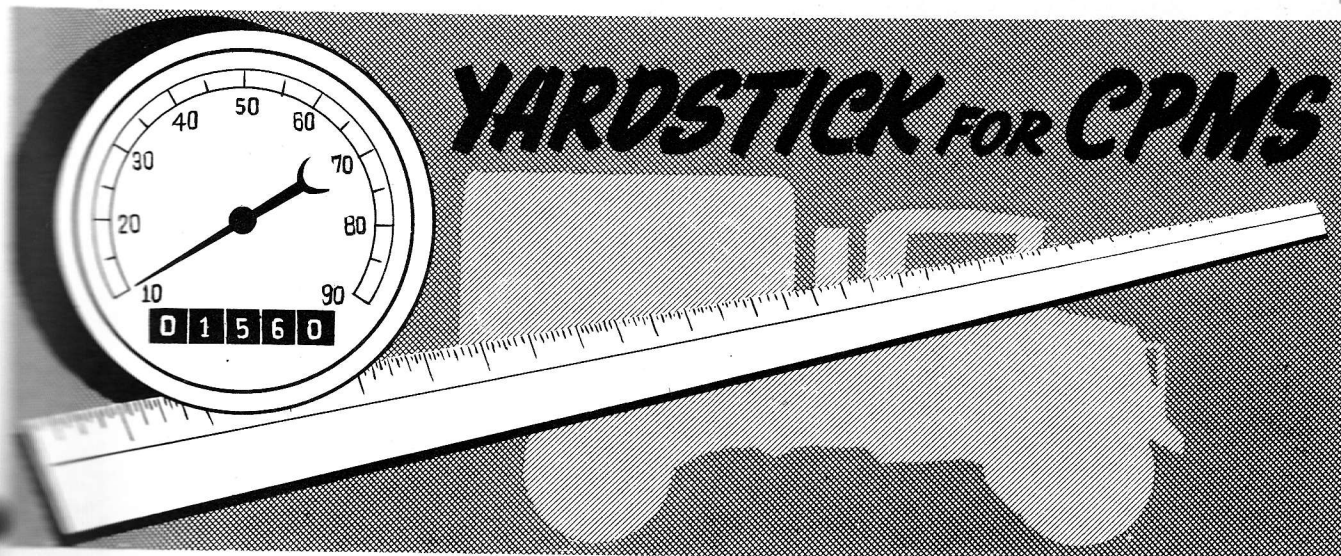
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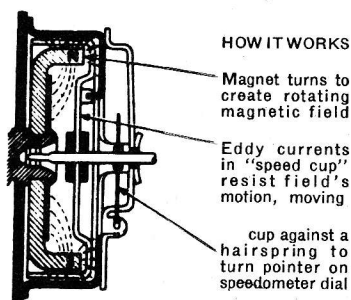
Your contributions of articles and ideas are welcome. Address all correspondence to the Editor, **CAM**, Directorate of Mechanical Maintenance, Department of National Defence, Ottawa.



The 'Speedometer' — or if we want to be more accurate and descriptive by calling it a combination speed indicator and mileage measurer — is probably the most familiar instrument on the dash of your vehicle — and probably the least understood. Ask any dozen assorted drivers how the speed indicator works and you'll get just as many assorted answers. One will say "gears and things" — the next might suggest "it's done with mirrors." If someone mentions magnetism he's on the right track. For a revolving magnet — driven by the speedometer cable — comes within the brim of an aluminum "speed cup". A field of force encircles the cup. While aluminum is non-magnetic, it does build up curious and little understood "eddy-currents" in the presence of a magnetic field. When the magnet revolves, setting up a rotating magnetic field, the eddy currents resist the rotation in direct proportion to the speed. The cup consequently turns. It's a similar application of the principle in the aluminum disk that runs behind the little glass window of your household electric meter. In your speedometer the revolving turns against a delicate

hair-spring, and a hand on the end of the speed cup shaft points to the proper figures on the dial for you to read.

The mileage measurer (or odometer) is a bit simpler. It is worked through a set of worm gears which turn the mileage indicators. These are geared at fixed ratios, usually 1001 turns of the speedometer cable to one — or one mile on the odometer. These fixed ratios simplify the calibrating of the



instrument at the factory where each is checked with constant speed electric motors at 10-30-60 m.p.h. on its dial.

Contrary to popular belief, 'Speedometers' do not get out of kilter very easily, but nevertheless do require some attention — mainly in seeing to the lubrication of the drive cable, and when you think of 'speedometer' drive cables — think of Mae West — keep 'em in graceful curves. This servicing

(as required by the Canadian Army Manual of Maintenance and Lubrication) should be given extra special attention and loving care because this is about the only failure (the drive cable rusting and breaking from lack of lube or kinks) that will ever occur to your odometer.

If the speedometer does conk out, get it fixed right away. New cables and kits of parts **are available** (we heard the rumour that they weren't and took special trouble to check this fact), so there's no excuse for a vehicle running around with an inoperative odometer because of the old gag — "we can't get parts!"

About now you may start muttering — So what, my vehicle runs just as well without a Speedometer as with one — what's all the fuss about? And here's where we come to the meat, you might say, of our tale.

Any maintenance system must be based on some sort of timetable to work effectively. The present system of Preventive Maintenance in the Canadian Army is based on mileage. It had to be based on some uniform foundation and experience has proven number of miles travelled is the

(Continued on Page 64)

SCREWDRIVERS

The scene—Driver Mechanic Class
at a Training Centre

The hour—Near chow time

The cast—Sarge O'Sweat and his stooges.

It is a cold bleak day. The boys are just in from driving class and are all in a heap around the pot-bellied stove getting thawed out and dreamin' of the good 'ol summer time and their sweet patootsies. Sarge O'Sweat is sorting over a set of hand tools on a nearby bench—"Today", he starts off, "after watching some of the screwy drivers on the M.T. course, I got reminded about screwdrivers—the screwdriver is a tool that's nearly as simple, but takes a lot more punishment, than screwy drivers.



"Before you ever become good driver mechanics, you'll have to learn to use your head, as well as your hands when using a screwdriver.

"So first off, get this into your heads, a screwdriver is intended for **one** purpose—to loosen or tighten screws, but young, green

greaseballs use a screwdriver for practically every other purpose—including trying to drive me crazy!

"Will someone remove L/Pte. Halftrack's elbow from the stove without waking him up—the smell of burning flesh always bothers me before lunch."

"Now," the sarge continues, "the standard screwdriver with its slim steel shank and wood or plastic handle is especially designed to withstand considerable twisting force for its size—but if used as a pry or pinch bar it will surely bend.

"Another thing—if you use the screwdriver for prying, the blade may break. The tip of the blade is hardened to keep it from wearing and the harder it is the easier it will break if much bending and strain is applied. If you must pry, use 'bars aligning and pinching' (or hire a detective). 'Bars aligning and pinching' are made for prying and are strong enough to resist bending.

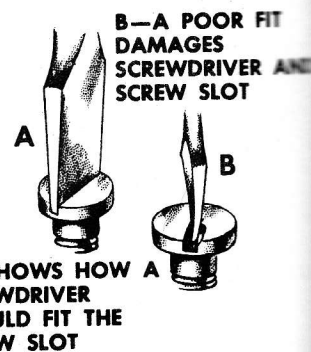
"Don't let me ever catch you monkeys hammering on the end of a screwdriver. It has never been intended for use as a cold chisel, a punch or a drift.

"Another thing you've gotta remember is selecting the right size of a screwdriver so that thickness of the blade makes a good fit in the screw slot. This not only prevents the screw slot from becoming burred and the blade tip from being damaged, but cuts down the force required to



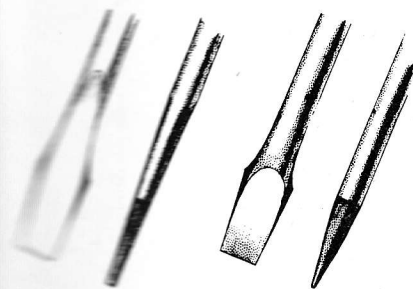
keep the screwdriver in the slot.

"If a screwdriver blade becomes damaged through misuse or if a corner chips off because the blade is too hard, the screwdriver can be made serviceable again by grinding it on an emery wheel. When grinding a damaged blade first grind the tip straight and at a right angle to the shank. Never hold the screwdriver against the emery wheel very long at a time and keep dipping the blade in water to keep it cool. Unless



this is done, the heat caused by friction against the emery wheel will draw the temper and the blade will become soft. After the tip is ground square, dress off a little at a time from each face.

CYLINDER HEAD STUDS

GROUND
RIGHTGROUND
WRONG

Be careful to keep the blade thick enough to make a fairly tight fit in the slot of the screw for which the screwdriver is intended. Keep the faces parallel for a short distance or have them taper in a slight amount. Never grind the nose so they taper to a sharp edge at the tip.

"So, gentlemen, if you want to be happy in the service, be kind to all screwdrivers, don't use 'em for prying, never hammer on the end of 'em, never use pliers on the shank to twist with — and if someone will now tap Halftrack on the nose with that 18" screwdriver on the bench there to wake him up, we'll break off for lunch."



* * *

The other day we innocently wandered into the inner sanctum of the Vehicle Maintenance department where the learned scribes who write those Service Information Bulletins were holding a forum.

The conversation was in Latin, but was Greek to us and as we had our Greek interpreter handy he gave us a 'play by play' on the back talk.

"Bartenus, may I borrow thine ear lugs? In our Winterization bulletins for wheeled "A" vehicles (S.I. 64) — "B" vehicles (A-5) and Universal Carriers (A-4) under the section having to deal with the cooling systems of our chariots — we made words to this effect — "warm up the engine and tighten all cylinder head studs using a torque wrench". Doest think perhaps that this is clearer than restaurant coffee to yonder mechani in the field?"

"A worthy point, Titus Adrumus", cried Bartenus, "suppose the ruddy head nuts or studs were 'frozen' or seized up — thy trusty torque wrench could read in figures of 90-130 lbs. and have no meaning to them. Better that they should be backed off a trifle to free them, if this sorry

state of affairs comes to pass, and then dealt with according to the torque specifications of the manufacturers' manual."

"Of a truth", goes on Titus, "you are cooking with fig leaves — supposing too that you have an aluminum head. Warming up the engine and immediately tightening up the head nuts is not strictly according to Hoyleus — a noble and sure procedure with cast iron heads 'tis true — but aluminum heads should be allowed to cool, after being brought to normal operating temperature, before tightening the nuts to proper tension."

Then up spoke the bold Bartenus. "Don't forget thy valve-in-head jobs either. When thou getest the torque wrench into play on their head nuts or studs thou must check the valve clearances — because they'll change sure as Minny was a moocher, due to the head seating lower onto the block and moving the valve stems away from the rocker arms."

At this point they started flipping for cokes — in Latin — which we knew was the customary signal that the meeting was adjourned.

* * *

LOOSE FLANGE NUTS

Here's a tip on a check-up you can make if the hand brake on any of your recent model 15 cwt., 30 cwt., or 60 cwt. 4x4s ceases to hold and/or there's an abundance of lube scattered around the underpart of the chassis.

In several instances, it was found that lube was being thrown from the rear drive flange of the transfer case and some of this was finding its way onto the shaft brake lining besides messing up

the under part of the vehicle generally. The trouble is a loose flange nut and can be corrected at the workshop by dropping the universal and tightening up the nut with a 1½" heavy duty socket. Reports indicate that some of these flange nuts have been taken up as much as 1½ full turns before tightening the nut to a solid seat, even on vehicles that have only done 400-500 miles.

* * *

CARB COUGH--

-- its cause and cure

How many times have you noticed your engine cough on a cold morning? Sometimes the coughing — or 'popping back' as it is often called — is sufficient to blow the air cleaner right off the carburetor.

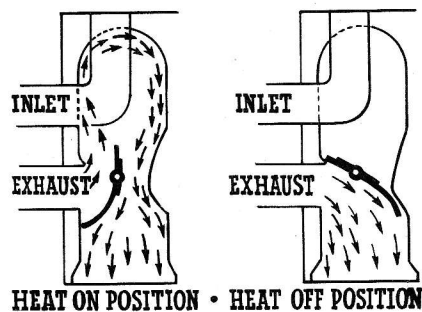
As you might expect 'Carb Cough' is more prevalent during the cold weather, and would lead one to believe the engine has caught cold and had a bad congestion — which is just what it has got.

What happens is this. 'Globs' of gasoline leaving the carburetor enter the intake manifold and due to insufficient heat these 'globs' are carried into the cylinders where they are ignited and continue to burn throughout the cycle of the engine. When the intake valve opens to admit a fresh charge of fuel to the cylinders, the new charge is ignited by the 'globs' of fuel that are still burning. This resulting explosion in the intake manifold is your 'cough' — a dangerous cough too as it can

cause a brisk fire — and destruction of the vehicle.

Practically all manifolds are designed so that the hot exhaust gases pass through a 'heat jacket' surrounding the centre portion of the intake manifold. The purpose of this is to insure uniform vaporization of the fuel-air mixture throughout the driving range. To control the amount of heat applied, a thermostatically controlled heat valve is located in the exhaust manifold. This controls the manifold temperatures so that raw gasoline does not cause this congestion in the cylinders.

At certain driving ranges, the exhaust pressure acting against



the heat valve counteracts the tension of the thermostatic spring and opens the valve.

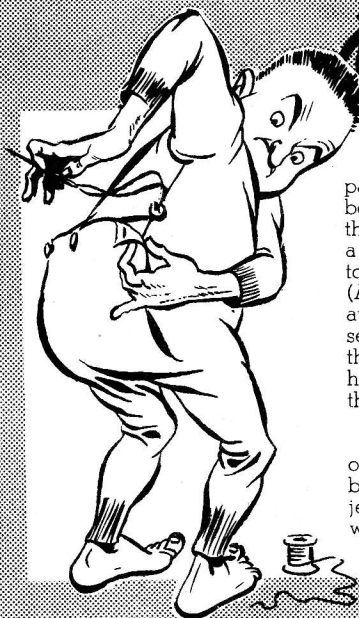
Sometimes this valve seizes and sticks in the 'heat off' position and during the warm up period there is no transfer of the hot exhaust gases around the intake manifold — and it is during this time that the coughing, or popping back, will occur.

The usual trick when an engine gets "carb cough" is for the driver to yank out the choke button. This stops the cough all right but is bad business as it leads to excessive crankcase dilution — and all the troubles that go with it.

The proper cure is to check the operation of the heat control valve and use a drop of penetrating oil now and then — the vehicle in turn will show its appreciation by better performance and greater gas mileage.

Don't forget, too, that all heat control valves are not automatic — some require seasonal adjustment and all should be kept in operating condition. Check them **carefully** at the 1000 mile (CPMS) inspection.

* * *



Rear Panel Reinforcement

To brace and reinforce the rear body panel of the quarter ton jeep, which has been cracking out under the weight of the spare wheel and auxiliary fuel tank, a modification bulletin (B vehicles 0-1) to tell how, and the necessary parts kit (A4625) to provide the means, are now available. If your jeeps are newer than serial No. 200740 you will already have these braces fitted by the factory. If you haven't got them **now's** the time to get that rear panel buttoned up tight.

The new kit will give you two brackets — one for each side of the rear panel. The brackets are to be mounted inside the jeep body between the sides of the rear wheel housings and rear panel.

Being previously unsupported in this manner, the rear body panel with the unexpected weight of the spare wheel and tire and the five gallon auxiliary gas can clinging to it was subject to terrific vibration and strain as the jeep travelled over rough terrain, the vibration soon crystallized the metal of the rear body panel which commenced to crack up like peanut brittle.

The new brackets will hold the rear panel in more or less peaceful repose — but doesn't provide an excuse to drive any faster over the rough stuff and beat the living daylight out of the rest of the vehicle.

WHAT GOES ON IN A BATTERY!



first battery in 1796 and discovered that when two different metals are linked, by a liquid conductor, an electric current will flow. Galvani's two different metals were the brass rod and the zinc stick, the liquid conductor was the fluid in the frog's legs.

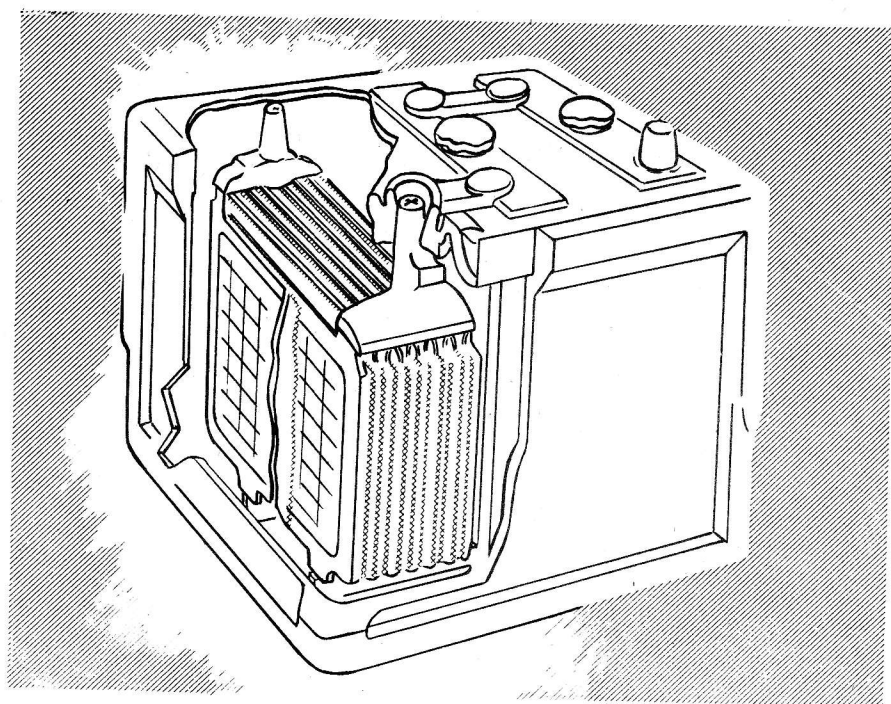
From this peculiar beginning, comes the present day storage battery in your truck. It gives you electricity in exactly that same old way — not frog's legs tickled with a zinc stick, but two dissimilar metals in a liquid conductor. It's a black, ugly box containing a miracle.

Don't, however, get the impression that the battery is the box of juice that runs the truck all by itself — the ignition system of the truck alone consumes enough electricity to choke a horse, and the powers of the battery are

limited. The point we want to make is that after a while the battery exhausts itself and must be revived. This exhaustion is a result of the very chemical process that produces the electricity. Something must be done to rejuvenate the battery — and fortunately your truck has just the machine to do it. That little machine is the generator. Besides rejuvenating the battery it delivers electricity to the hungry ignition system, operates the lights, the horn and the radio.

You've seen it — it's that cylindrical thing up near the front of the engine run by the fan belt. Since the fan belt doesn't operate unless the engine operates, you realize that the generator generates only when the engine is running.

Well, then, you ask, if the generator furnishes all the electri-



What's in that black, ugly box we call a battery? It has no shape, it's not streamlined, and it's got practically no sex appeal. What's in it?

A miracle, that's what's in it. No moving parts, there's no noise from it, and yet it produces something — all right, electricity. What's it got and what goes on inside there?

That is a long and thrilling story and it goes back to the years around 1790 and a man named Galvani. Galvani lived in Italy and was one of these curious souls who throughout the ages continually hack away at the veil of ignorance. One bright day, in a moment of scientific fervour, this Galvani took a pair of frog's legs on a table and tickled them with a zinc stick.

Really enough enterprise for a grown man you might say, but when the frog's legs leaped convulsively and almost giggled out loud Galvani was delighted. He sat down and thought about it. A little while he knew that he had discovered one of God's great secrets.

Alessandro Volta, a fellow countryman of Galvani, made the

city needed to keep the truck running, where does the battery come in?

To answer that question, we'll ask you a question. How does the truck get its electricity when the generator isn't working? And remember the generator doesn't work when the engine is stopped. You must have electricity to start the engine and you know you can turn on your lights, blow your horn and play the radio with the engine off. Where does the electrical power come from?

The answer is, the battery.

The battery comes across with the electricity when the generator is off duty. That, in a nut-shell, is its function. With the generator off, it starts the engine, lights the lights and blows the horn.

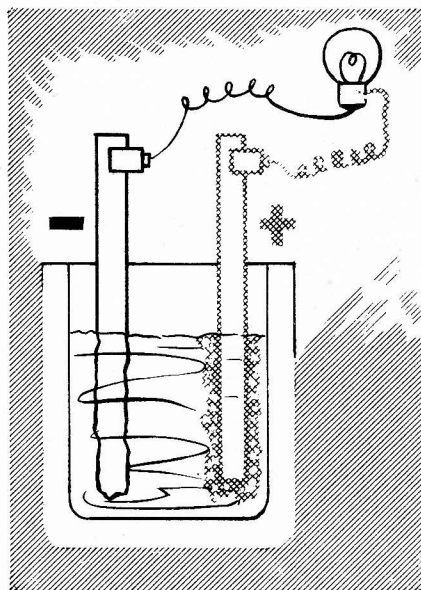
The next question is, how does it do it? Being of sound mind and body, you realize that you just don't set a pair of frog's legs up in business or stick two different kinds of metal in water then sit back and count the volts. There's more to it than that. The amount of electricity produced this way, you could stick in your ear. What you need is a hotter process that will pony up electricity faster than nine electric eels on Saturday night. And that's what you have in the battery in your truck. A hot process: two different lead plates in a solution of sulphuric acid and water. The sulphuric acid and water is known as the electrolyte (pronounced "Electric light" by the pool room crowd) and it attacks the lead plates something fierce. The by-product is electricity.

As we warned you before, the whole thing is a miracle. We'll go into it deeper farther on.

The lead plates — usually in groups of from thirteen to twenty-one — live together with electrolyte, in a hard rubber or composition jar. The jar is called a "cell".

There are three cells to the battery in your truck — because of a very peculiar reason. The reason is that no matter how big the cell is, whether it's as big as a house or as small as the end of your nose, it'll only produce two volts. That's all: two volts per cell.

Since your truck has a six volt ignition, lighting and starting system, it takes three cells to supply it. And that's what you've



got: a three cell battery.

The three cells are contained in that black, ugly box we were talking about and the box itself is resistant to acid and mechanical shock. This doesn't mean you can lob it up against the wall for exercise. And it doesn't mean that you can let it jingle along loosely in its cradle in the truck. It must be kept tight and frequently inspected for spilled acid that might corrode the metal of the cradle.

The plates, though bunched cozily together in groups of positives and negatives, are each separated from the other by wood or hard rubber separators. These separators are porous to allow a

free flow of electrolyte and are grooved to allow for the escape of gas bubbles that arise during charging (rejuvenation of battery). They also let any material that flakes off the plates, fall to the bottom. If and when these flakes fill up the space provided for them at the bottom of the plates and then actually touch the plates a short circuit results and pop goes the battery. Old batteries frequently run into this trouble.

Primarily, however, the separators are necessary so that the electricity can be properly milked off. Without separators, the plates would touch and short-circuit, spilling electricity all over the place. To milk the electricity properly, there is a little "lug" or stump at the top of each plate that acts like a cow's spigot and directs the electricity off to the main channel: the "terminal" or "post". You'll notice two of these posts to each cell, one to handle the electricity from the positive plates, the other to handle it from the negative plates.

Anything on the truck that needs electricity from the battery tosses a line to these posts (via a cable) and gets it from them.

That little manhole cover between the posts is where water is added to the cell. It also has a tiny vent hole to allow the gas to escape. This vent hole must be kept clear of dust and dirt.

But about that miracle of producing electricity from two kinds of lead plate immersed in a solution of sulphuric acid and water — the story goes something like this:

When the cell is fully charged, one of these plates — the negative — is grey, metallic, spongy lead. The other — the positive plate — is brown peroxide of lead. The electrolyte contains its maximum of sulphuric acid. Both plates are very porous, the electrolyte is very strong (comparatively

speaking). A cell in this fully charged condition is rarin' to go and will produce its full quota of electricity through the chemical reaction between the electrolyte and the plates.

When the circuit is closed—when you step on the starter or turn on the lights—the cells start discharging or giving up their electricity. The chemical process that takes place during this discharge changes the lead of both the positive and negative plates to lead sulphate. The sulphuric acid in the electrolyte combines with the active material of the plates. As the discharge continues, both plates change more and more to lead sulphate and the sulphuric acid keeps on combining with the active material of the plates. And all the while, electricity is pouring out.

This, of course, could keep on 'til the plates were changed entirely to lead sulphate. Then it would stop because there would no longer be two dissimilar plates, both plates would have changed to the same substance: lead sulphate.

Under the eye of a careful driver this is not allowed to happen. What does happen is that the cells discharge for a short time—say, while the starter is being used—then the truck runs along and the generator recharges them up again, by throwing a direct current into them. The feature is that the chemical action between plates and electrolyte, is reversed: the lead sulphate on the plates starts turning grey spongy lead and new peroxide of lead again on the positive and negative plates respectively, and the sulphuric acid returns to the electrolyte. We might say that charging, by reversing the chemical process, restores the electricity in the battery.

Loss of the water, during

charging, is broken down by the electric current into gas bubbles that rise and float away. This water must be replaced in the cells about every week or so.

The generator—a mighty machine is he—is able to supply electricity to the ignition system, the lights, the radio and even have some left over to charge the battery as described above. However, all this can be too much of a burden for even the generator, mighty or no mighty. The best practice is to go easy on the electrical accessories and let the battery get all the juice it needs. Furthermore, plates changed entirely to lead sulphate won't be revived at all. Not being "two different metals", they won't respond to the charging current from the generator. The rule about "dissimilar metals" works both ways.

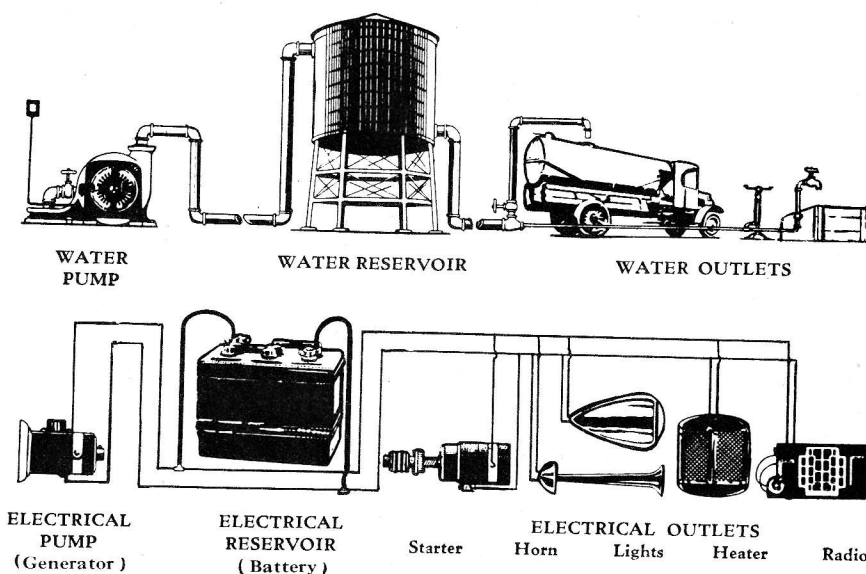
The capacity of the battery to produce electricity depends on the conditions it operates under. At a high, continuous rate of discharge—as in starting—the battery won't last as long as at a low, continuous rate of discharge as used by the headlights. Then

again, in cold weather the battery is not as efficient as in warm weather—because like any other chemical process, the one in the battery is slowed down. As a matter of fact, at 0° Fahrenheit, the battery has only 50 percent of the cranking power it has at 80°.

The careful driver, knowing this, will keep a sharp eye on the way he mistreats his battery in cold weather. But then in warm weather, the water in the electrolyte evaporates off (besides being broken down by the charging current), so he's got to watch and see that it gets replaced. It gets you coming and going, shut the door and they come through the window.

Having introduced you somewhat (we presume) to what goes on backstage in the battery, we will next month reveal to you the hitherto unexposed story (exclusive in this magazine) of "How To Sweat Every Drop of Juice Out of Your Battery" by a few simple tricks. (That's not the name of the author).

* * *



JEEPS CAN



We can't help thinking of Icarus when we see Jeeps acting like the ones on this page.

You remember Icarus. The ancient Greek legend tells how his father made wings from feathers held together by wax and the two of them used to soar around like birds.

But Icarus, one day, ignoring his father's warnings, went too high in the air and the sun melted the wax in his wings and down he came into the sea.

It's only ancient legend of course, but it tells a story that's just as applicable in 1944 as it was nearly three thousand years ago.

Icarus couldn't resist the temptation to see how high he could go, despite the advice and warnings of wiser council.

In doing so he abused a mode of locomotion that was still susceptible to the laws of nature.

Jeeps, too, believe it or not, are susceptible to these laws.

On our cover this month we show how a good soldier would **not** treat his colonel — and how a good driver would **not** treat his jeep — and on this page are typical "glamour" pictures of people, like Icarus, trying to make jeeps fly — they are succeeding only in blasting the daylights out of themselves and the jeeps.

According to all informed sources, vehicles that fly are commonly known as Aeroplanes, Gliders, Blimps, etc. Quarter ton 4 x 4 light utility trucks are never mentioned in this respect and lack many essentials in design (wings, for example) necessary to provide good aerial locomotion.

The Jeep was originally designed as a reconnaissance car and was developed over a period of about ten years into its present form. That's a fairly long period of development but the result has been a vehicle that has met the approval of all ranks and proved one of the best and most practical automotive contributions to modern warfare. The jeep is easy to drive and is probably the most agile of our vehicles.

But this reputation has been exaggerated far beyond the ability of the jeep, or any other vehicle, to live up to.

However, if you're ever feeling in an argumentative mood and wish to provoke a slam-bang-up debate some quiet evening, just elbow your way into a group of soldiers and make a statement like "I don't think a jeep could get up **that** mud cliff", or "I'll bet a jeep couldn't climb **that** tree". Right off you've got a full scale battle on your hands with the lads who figure a jeep can do anything. And don't think these jeepists haven't lots of evidence to back up their arguments, too.

National advertisers, and their commercial artists, have seized on the jeep as the symbol of army toughness and mobility, have picturized the jeep doing everything that the limits of their imagination will allow. Quite common are pictures of jeeps



LET'S BE SENSIBLE ABOUT JEEPS — DRIVE THEM

W'N'T FLY!



...ing off from ten foot cliffs into rocky creeks —
travelling at terrific speeds over boulder-strewn
cliffs or over sand dunes (always a cool three or
four feet off the ground) while about six grim looking
gentlemen on board pour machine gun fire in all
directions. 30 ton tanks lie in smoking heaps all
around and planes come raining down in flames from
the sky.

The greatest heroes of Greek mythology with their
winged horses and feather and wax wings are pikers
compared to our Joe with a jeep.

These "hollywood shots" and the accompanying
extravagant press publicity have provided Joe Mush
with the excuse for jumping into a jeep and seeing
what he'll do and generally giving her hell whenever
the opportunity arose. This keeps the M.Os, the
factories and workshops busy, but doesn't keep
him awake nights.

Don't think that we're belittling the jeep — we'll
agree with every other fellow who's driven one,
that they're a remarkable little buggy, outstandingly
sturdy and reliable, and capable of going places
that would make a western pony stop and think
twice. But they're still a 5 cwt. 4 x 4 built like
any other army vehicle — with a chassis, axles,
springs, wheels and lots of nuts and bolts subject
to breakage and fatigue, loosening, and strain,
and while they will take an enormous amount of
abuse, unfortunately this leads to the belief that
they can be abused indefinitely.

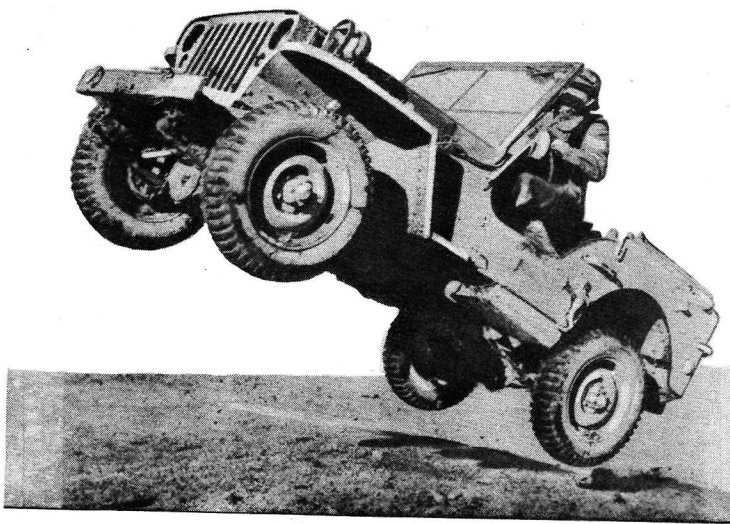
Let's be sensible about jeeps.

Remember they are subject to the civil speed limit
on any highway and the military maximum of 40
m.p.h. where the civil laws are higher than this.
This country calls not for aerobatics but careful
commonsense driving — the avoidance of rocks and
potholes. Flying close to the ground or just hitting
the high spots with a jeep is spectacular but plain
danger to the vehicle.

We have a well equipped air force and they have

machines that can get well off the ground and miss
even the high spots; let them do the high stuff while
you stick close to the contours. Overseas, a jeep
is driven with care — just like any other vehicle,
because the driver knows that if he mistreats it he
can break something — and he'll be foot slogging
his way — instead of having the services of a good
vehicle. If you don't believe us — take a careful
look at all the **authentic** photos and news "reals"
from the front showing jeeps in use. They're not
driving them as tho' the back panel was trying to
bite the seat out of their pants. They know a jeep
can't do the impossible and must be driven sensibly on
the ground — that it must be regularly checked and
lubricated, and, if abused, is subject to failure like
any other man-made piece of equipment, and most of
all, they know that an ounce of driver **preventive**
maintenance is worth a pound of workshop cure.
Preventive maintenance in this case meaning — keep
that jeep where it belongs — on the ground.

Take a tip from these blokes, who, like Icarus'
father, know what they're talking about.



ON THE GROUND. LIKE ANY OTHER VEHICLE!

MOTORCYCLE CHAINS

"Wadda you know about chains, Staff?" piped up Sergeant Hutch one day while he was busy smoking S/Sgt. Cranberry's last cigarette.

Chains?—chain letters? Chain gangs or chains, anchor, ships for the holding off?" sez Staff absent-mindedly.

"Drive chains!" replies Sgt. Hutch, "especially m'cycle rear drive chains—rear drive chains that wear out too fast no matter, it seems, what you do for 'em. Take for example some m'cycle fellows I heard about recently out West. They do their riding in lots of sand it seems and are always havin' to lose sleep worrying about

their rear drive chains wearing out. With the automatic chain oiler set to feed normally they found that the oil just collected the sand on the chain and it acted like a grinding compound. Just ate the heart out of their chain in no time at all.

"So . . . ?" queries Staff.

"So, being worried about the acute cases of 'caved in eyes' their m'cycle riders were developing from worry over their rear drive chains they did a bit of experimentin'!. They shut off the oil supply to the chains altogether (by removing all the shims from the metering valve.)

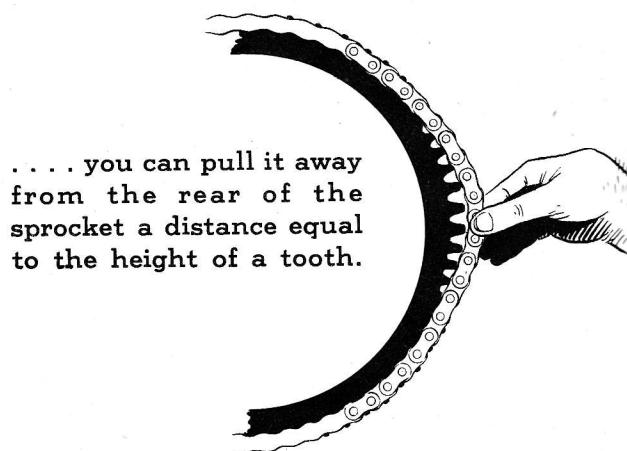
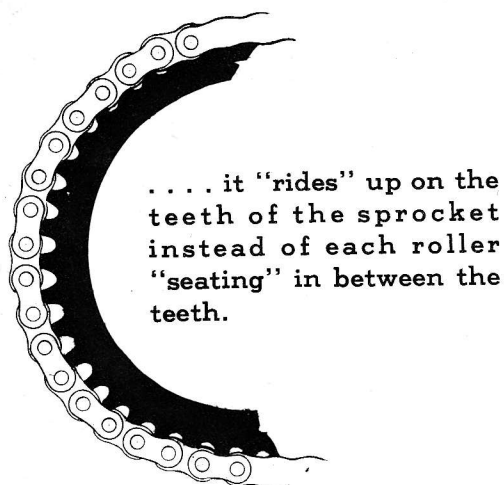
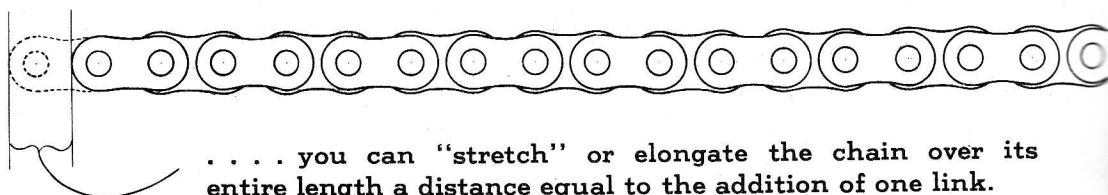
"An' let the chains run **dry**?"

says Staff in horror.

"Yep—run 'em dry is what they did", says Sgt. Hutch, "and believe it or not they claim their chains lasted 50% longer than when they oiled 'em. Y'see there was no oil for the sand to stick to and while I agree that chains wear out pretty fast without oil they don't wear out as fast as a combination of oil and sand for luba. It was a case of picking the lesser of two evils."

"Well," says Staff, "I get their point alright and it sounds like it might be a solution to cutting down chain wear in sandy country. But don't forget—chains that are run dry should be removed every

The chain is "shot"—IF...



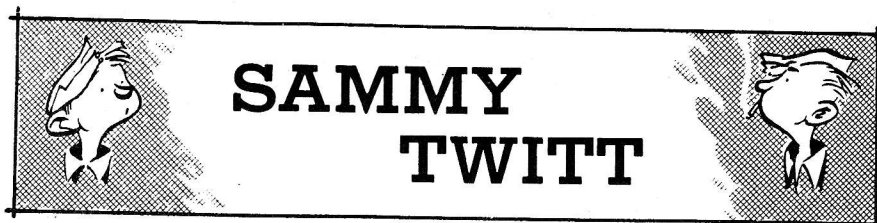
250 miles and soaked in hot oil for about 20-30 minutes, hung up to drain and then the outside wiped off dry — that's quite a chore every 250 miles. Did they try the other method — over oiling 'em? In other words, put enough oil on the chains to wash the sand off as fast as it gets on. I see, with the oil feed set for normal use the chains get **just enough** oil for proper lubrication, and also just enough to make the sand particles **stick**. Now if you put enough oil on to cause it to fly off as the chain revolves—and take the particles of sand with it — why your chain gets enough for lube purposes and is 'wet' enough to let centrifugal force 'throw' off the grit. What are yuh smiling at yape?"

"I was just thinkin' ", says Sgt. Hatch, "of them poor throttle chokers' faces when they try to find the rear end of their m'cycles under the coating of oily sand that has been deposited there from the chain."

"Well", says Staff, "here again you've got two evils to choose between. Sure you're gonna get a bit messed up with oil over the rear fenders, frame and parts — but it's easier to wash it off than be continually refitting and adjusting chains. You should wash off the machine every day anyway."

"I heard somewhere that there will be an official service information bulletin in the field shortly on this chain lube business so that should settle the question. I'm gonna keep an eye peeled for it anyway because I'd like to see which — my 'dry' method or your 'soak 'em' system — keeps 'em running the longest! But I'll bet you your last cigarette that either one of them's better than just enough oil to make the sand stick."

(What about an opinion from some of you m'cycle experts in the field — Ed.)



Now Sam's name 'as become quite a byword
And t' officers after a bit,
If sumwun did owt a bit gormless
Invariable called them a Twitt.

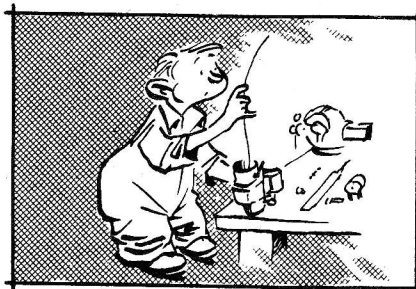
One day lads in t'ranks 'ad a pal in
Who said that 'e felt a bit blue,
They told 'im they'd summat to cheer 'im
And took 'im where Sam were on view.

When Sammy came into the garage
The visitor started to laff,
So they stuffed bits of waste in 'is cake 'ole,
To stop 'im from blowin' the gaff.

Well, Sam started out like a 'ero,
The work to be done wasn't long,
But 'e kept up a beautiful average
And in three jobs did every one wrong.

'E first took a wire from 'is trousers
And bunged it through jets o' the carb:
It's a mercy the sarge didn't see 'im,
'E'd 'a lashed 'im wi' tongue like a barb.

They caliber jets to a measure,
Wi' limits as fine as they make,
And pokin' wi' wire to clean 'em,
'S like pickin' yer teeth wi' a rake.

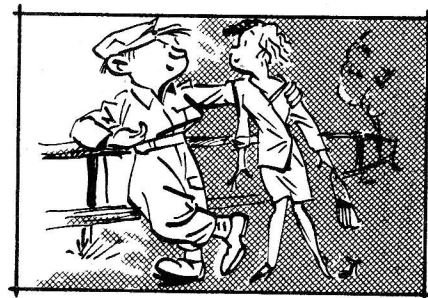


A ruddy good blow were the ticket,
And Sam's wind were as strong as they make
'E'd a pressure as 'igh as a bagpipes
'As played by the old "forty-eight".

** Lancashire for 'cluck' (and it rhymes better anyway).*

Next Sam tried 'is strength on t' spark
plugs
And didn't 'e just treat 'em rough;
That cave man stuff's aw' reet wi' females,
But plugs is more delicate stuff.

'E lugged at 'em fair wi' a shifter,
When a 'box' is the thing tha'll depend,
Then in tryin' to set 'is gaps proper,
'E'd give central electrode a bend.



If only them plugs could 'a spoken
They'd 'a given the fool such a cuss
And like boss o' the work'ouse at
Christmas,
Sed, "You'll get no more sparkin' from us."

"We don't want us porcelain crackin',
Give us more care, you clook*
And set us gaps proper wi' measure,
Like it sez in man'facturers book.

Now inside t' generator 'ousin'
And in t' motor for startin' as well,
There's a thing as they call t' commutator:
Tha' knows it—I don't 'ave to tell.

If tha cleans 'em up every so often,
Wi' a strip of sand paper 'OO',
It'll 'elp wi' the brushes and chargin',
But **never** use **emery** y' know.

'Cos emery to 'comms' is like fig seeds
To a man wi' false teeth in 'is gob,
But do I 'ave ter tell thee what Sam used
When 'e started to get on the job?

YOU DON'T DRIVE MULES... BUT—



Once upon a time there was a mule driver who saw a speed limit sign for the first time and said "Mules, we'll have to go across country — we can't travel that fast!"



Remember that the signs indicate the **maximum safe speed** — not the speed you've got to drive. Keep well within the speed limits and you'll get there just as soon and all in one piece.

For B.F.s

.... RIDING THE CLUTCH

There is something about a set of foot pedals that exercises a strange fascination for B.F. drivers. Some of them behave as if they were learning to play a harmonium. Ninety percent of their output comes from the bottom end of their battle dress. They accelerate with a rush. They brake with a jerk. They slam the clutch in and out. And they go on like this until something cracks up — or until a patch of greasy or icy

road teaches them a lesson. Others regard the pedals, particularly the clutch pedal, as a convenient footrest thoughtfully provided by the manufacturer for tired feet.

These clutch-riders — we won't tell you what the engineers call them — are among the worst B.F.s of the lot. Only a mechanic who takes a clutch to pieces after they have finished torturing it knows how much harm they do — and how much he'd like to do to them.

The clutch pedal is not a foot rest. It is provided for the purpose of disconnecting the transmission from the engine. You disconnect these two by pushing the pedal with your foot. When you take your foot off again, the pedal (and the engaging parts) are returned by springs.

That clear? Right. Now if you make a habit of resting your foot on the pedal when you don't want to use the clutch, the weight of your foot (and part of your leg) has to be supported by these springs.

We don't know how big your foot is — we sincerely hope we never shall — but in an army boot it weighs a lot. The springs have to carry that weight.

All the time they are trying to keep the clutch plates hard up



... a strange fascination for B.F. drivers ...

against one another, you are doing your best — or worst — to stop them. And the result is that the plates are not held together as firmly as they ought to be.

Remember, they have to take a lot of strain. All the power of the engine on one side; all the weight of the vehicle and load on the other — and only friction surfaces to take the drive from one to the other.

Obviously, if you don't keep these friction surfaces hard up against one another they are going to slip. They do slip — and however much the pleasant smell of burning reminds you of home, it isn't in the best interests of the vehicle.

One of these days we hope they'll perfect a device which will carry the heat of a burning clutch up the trouser leg of the B.F. responsible. In the meantime, they are forced to rely on you.

Don't ride the clutch. There is enough space on the cab floor for the biggest of left feet. Make us of it — it was put there for the purpose — and only place your foot on the clutch pedal when you are using the clutch.

* * *



... the pleasant smell of burning reminds you of home ...

"Potent Stuff - This Petrol!"

The screwball sniffed the air delicately and purred, "I like the smell of gasoline. I like the smell of new-mown hay. I like the smell of fresh tobacco."

With this, he dropped the hose with which he had been filling a five gallon can of gasoline and brought out his trusty pipe. From an ancient pouch, he filled it with tobacco. He fumbled in his pocket for a match and scratched it across the seat of his jeans.

There was a loud bang and the screwball vanished. He was sighted some time later over Wauville, Man., and is believed responsible for an air raid "alert" in the Vancouver area that lasted for twenty minutes.

Even if he hadn't lit the match, the screwball would probably have wound up a dead pigeon from the sniffing operations alone. For the dangers of gasoline come in packages of three: fire and explosion; poisoning from inhalation, and skin irritation.

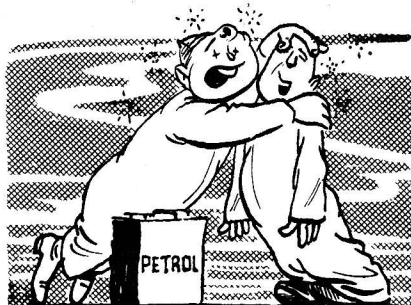
Of the first, everybody knows how explosive gasoline vapours are — and the lunthead above found out. But not everybody knows that gasoline vapours are pure poison when inhaled (danger number 2). As a matter of fact, one-tenth of the amount of gasoline vapour in the air necessary to cause an explosion, is harmful if inhaled. A couple of good snorts will cause dizziness, nausea, and a rollicking good headache. Large amounts

will deliver the same results as a michael finnegan of the most potent variety—namely . . . eight, nine, ten and you're out.

Headache, dizziness or a beery sensation accompanied perhaps by an intense desire to sing Sweet Adeline, are a warning that too much gasoline vapour is at large. A quick dive out the window into the open air will clear up the early symptoms — but if anybody has been knocked out by the fumes, run, do not walk to the nearest doctor.

The third danger, skin irritation, is not so widely appreciated. Gasoline, if allowed to remain in contact with the skin will cause severe burns—and we don't mean lit gasoline. Wearing absorbent gloves while handling gasoline is a bad practice and clothes and shoes that have become saturated with the stuff, should be changed—but fast. And keep away from fire — or you're a toasted marshmallow.

Dishpan hands may be acquired through exposure to gasoline because the protective oils are



removed from the skin and chapping, roughening and cracking are sure to follow. In some cases, dermatitis will result. This is an inflammation of the skin that usually starts on the hands and spreads over the entire body. You'll love it!

Wash off any gasoline that has got on the skin, with soap and water.

As to the biggest danger lurking in gasoline — fire and explosion—talking to most people about this yields the same results as talking to a brick wall. It requires a deep and thoughtful mind to understand that gasoline vapour rolls along the ground like a thick cloud and goes boom! when it encounters a spark or a flame. But just on the off chance that somebody in the audience loves life, here's a list of precautions guaranteed to save your own or somebody's else's life at one time or another. Read them and keep off the deadline.

(a) No filling of tanks, transfer of gasoline, or other operations which involve exposure of gasoline to air, should be carried out near open fires, motors in operation, or lights that could ignite vapours. Men engaged in such work must not carry matches, and smoking in the immediate area should be forbidden and prevented by supervision.

(b) Work should be done in the open air if possible, and good

(Continued on Page 64)



PACKING WHEEL HUBS

**"WHEEL HUB PACKIN' MAMMA—
LAY THAT GREASE KEG DOWN"**

Every now and then we hear mention of that old quotation — To pack or not to pack wheel hubs.

Down in the U.S. at a mass meeting of the Manufacturers, Army Ordnance, (British Maintenance men too) they've just settled the question once and for all.

So the thought struck us that perhaps it wouldn't be a bad idea if we brought up the subject ourselves and settled some points that may be bothering our boys — and maybe some of our vehicles.

Our polite enquiries brought forth many and complex explanations from the faculty of the local College of Mechanical Knowledge but like we've been reading the spies do — we put all our pieces of information together and arrived at some definite facts.

The number 8 hats are 100% in agreement that you **don't** pack the wheel hubs between the bearings.

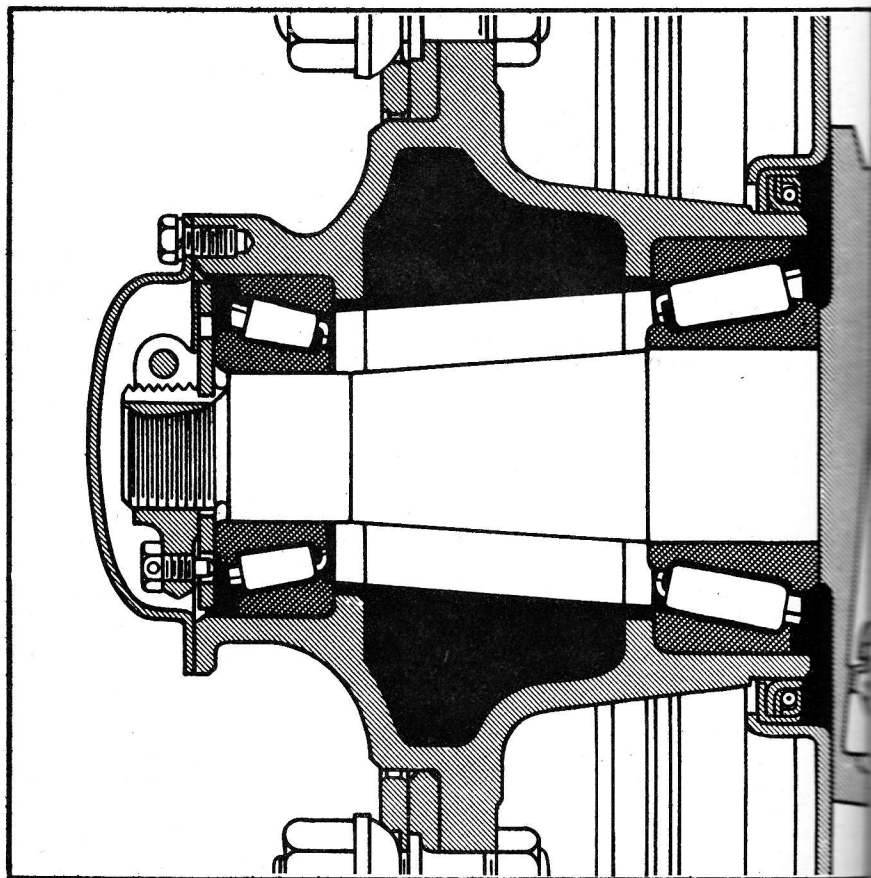
Some manufacturer's shop manuals say "Pack the hubs" on one page and then explain on another page that they don't mean pack the hubs between the bearings — just the bearings — which might tend to be a bit confusing

to some of us — or maybe we confuse too easy.

This quaint information plus the fact that in days gone by wheel hub packers were a recognized fraternity in Automotive Society, may account for the occasional present day revolting sight of a wheel hub grease packed as tight

as Uncle Louie was the day he resigned from the Band of Hope.

The theory on which the "pack the hubs" fraternity worked on goes something like this. First they point out that the grease in the hub forms a dam which prevents the grease in the bearing cage from running out when the



*Fig. 1—Solid black represents grease—
if there's this much in the hub you'll
soon be relining the brakes.*

Fig. 2—Heavy black lines show way hubs would be greased if you like doing things the right way.

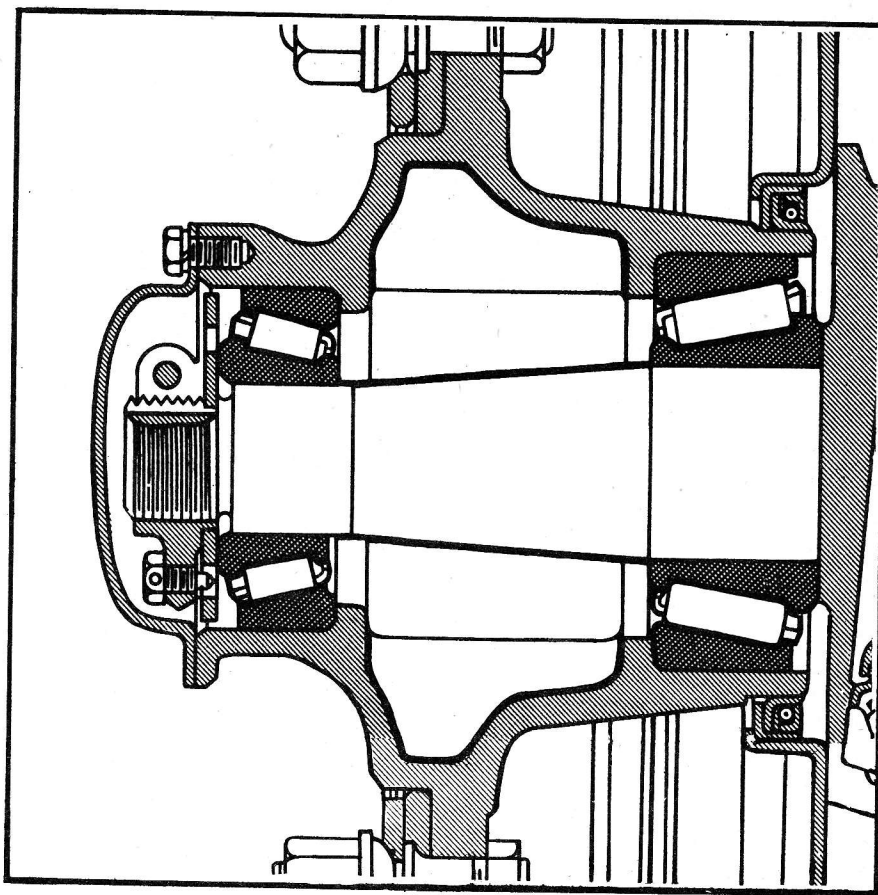
bearing gets hot. No grease in the hub, they explain, would cause the grease in the bearing to run before the 5,000 mile servicing came due (C.P.M.S. 5) and you'd end up with burned bearings.

Back in the early days of automotive history they could probably pack wheel hubs — with anything from cup grease to maple taffy and nothing serious would come of it. But with the advent of four wheel brakes, enclosed internal expanding brakes and considerably higher speeds, loads, and braking requirements creating considerable heat close to the wheel bearings and hubs, the picture changes.

In this day and age here's what happens — the grease in the hub gets hot — It expands. When the grease seals are new and extremely snug, they will probably stand the pressure but when they start to wear — watch out. The grease leaks through the seal and into the brake drum. Centrifugal force makes sure of an even and copious distribution to the brake linings. In no time at all comes the gripe — "Me brakes ain't no good!"

Don't worry that the bearings will run short of lube when no extra lube was bunged into the hub. Tests have proved that if the bearings were packed properly, the grease **would** lubricate the bearings for the full 5000 miles between servicing — just as surely as tests, and experience, have proved that **hubs** packed with grease will transfer that grease to the brake linings — within a few hundred miles in many cases.

So today it's pack the **wheel bearings** — not the **wheel hubs**



and the up-to-date lube expert will tell it this way.

First, remove the bearings and put them into **clean** solvent. Let them soak for a while — this will help clean **all** the old grease from the inside as well as the outside of the cages. While they're degreasing you can do a good job of cleaning the axle shaft and hub.

Take a look at the bearing races and if they're worn or pitted — replace them. Then smear a thin (not more than 1/16") coating of wheel bearing grease (DND 673) inside the hub and on the axle after they're cleaned. This will prevent rust.

Now take the bearings from the Solvent and inspect them. Don't dry them with compressed air — or worse still — indulge in that playful little trick of spinning them with the air gun. These are two sure ways of mutilating a

good bearing.

Everything passing inspection, hand pack them with DND 673, Grease, general purpose No. 3 (as specified in the Canadian Lubrication Guides). Knead the grease in from the large end of the cage to the small end till all the spaces in the bearing are full. Smear a **little** on the outsides of the rollers — and you're all set to reassemble. That's all you need. No slab of grease goes into the hub — you've already smeared on a thin coating to prevent rust. Just make sure your grease seals are OK and then reassemble the bearings and wheel.

Now rest happy in the thought that you've put grease where you **don't** want friction — not where it will get to the brake linings — where friction is what you **do** want.

* * *

YARDSTICK (Cont'd from Page 49)

logical, easiest and simplest basis to measure vehicle servicing requirements by.

Which means that the "mileage measurer" (in other words your odometer) controls the whole system. If it is out of order how do you know when you are due for a 500, 1000 or 5000 mile lubrication and check? How can you fill in the P.M. recorders properly? How can you get a gasoline consumption or oil consumption? Or put another way, without the odometer, how do you know where the sam'ell you're at?

So you see, the speedometer has ceased to be just a sort of deluxe accessory to give aid in telling the story of how Joe McSnorter once did 95 per (with the wind) in the heavy breakdown.

The recording of the distance a vehicle travels is a necessary part of Preventive Maintenance.

The mileage measurer (or odometer) therefore, is as **necessary** to Preventive Maintenance as a timetable is to a railway company — or a measuring scale to a draftsman.

We shouldn't have to say how necessary Preventive Maintenance is to keep our equipment rolling — perhaps the fact that it's the concern of more people in the Army than anything else, proves something.

What do you think, Joe?

* * *

POTENT STUFF (Cont'd from Page 61)

ventilation must always be maintained. Gasoline vapour is heavier than air and if not removed will settle in depressions (trenches and ditches) or flow into basements at some distance.

(c) Gasoline should be used as a motor fuel only (except in field stoves where white gas is used). It must not be used for cleaning or as a solvent in repairing machinery.

(d) Care must be taken to avoid spilling gasoline. It must not be emptied into sewer lines or cesspools, since vapours may travel great distance through these channels and be ignited elsewhere.

(e) When large quantities of gasoline are being transferred and the flow is rapid, the tank that is being filled should be grounded or the hose employed should carry ground connections, to avoid accumulation of static electricity. This hazard is intensified when the air is very dry and the container into which the gasoline is being run is well insulated from the ground.

(f) Proper fire extinguishing equipment should be at hand whenever gasoline is transferred or loaded.

(g) Rags or waste saturated with gasoline should be destroyed and not left lying about as a source of vapour or fire hazard.

* * *

IN THE MAIL . . .

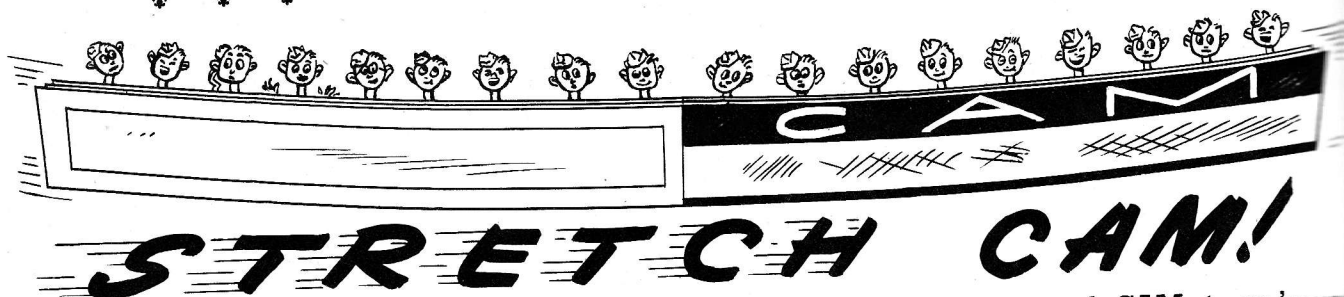
One of the most interesting things that bounced out of our mail bag this month was from Brantford, Ontario, and took the form of a little mimeographed folder entitled "Drivers' Monthly Bulletin."

The lads at the C.A.(B)T.C. there have apparently been using their heads for more than hat racks and whipped up this idea, the purpose of which, and we quote their folder, "... is to bring to the attention of drivers items of interest to be found in . . . **CAM** . . . enough copies of which are not supplied for distribution to all drivers . . ."

We note that they enlarge on and add to some of the items to fit local interest and also plug any driving and maintenance dope they want to put over themselves.

CAM has a tough time getting round to all the boys and here, it seems, is one way of getting the goods delivered. Altogether, we think it's a very smart and useful idea, and so, pass it on to the lads as a suggestion worth copying.

Don't say the thing's impossible —
Chances are you'll rue it,
For some damn fool who doesn't know
Will come along and do it!



The mostest men will get to read **CAM** if you'll get the good habit of passing each issue along to the next guy as soon as you've read it. We'd like to send you a personal copy but unfor-

tunately there's not enough **CAM**s to go 'round on a basis of one apiece — so keep **CAM** movin' — to help keep 'em rollin'!

TURRET TALK PRESENTS ...

"IDLE RADIALS"

IT'S HERE

Service Information Bulletin entitled
**ENGINE STARTING and
STOPPING PROCEDURE**

R-975-C1 ENGINE

(Adults only)

IT'S OFFICIAL

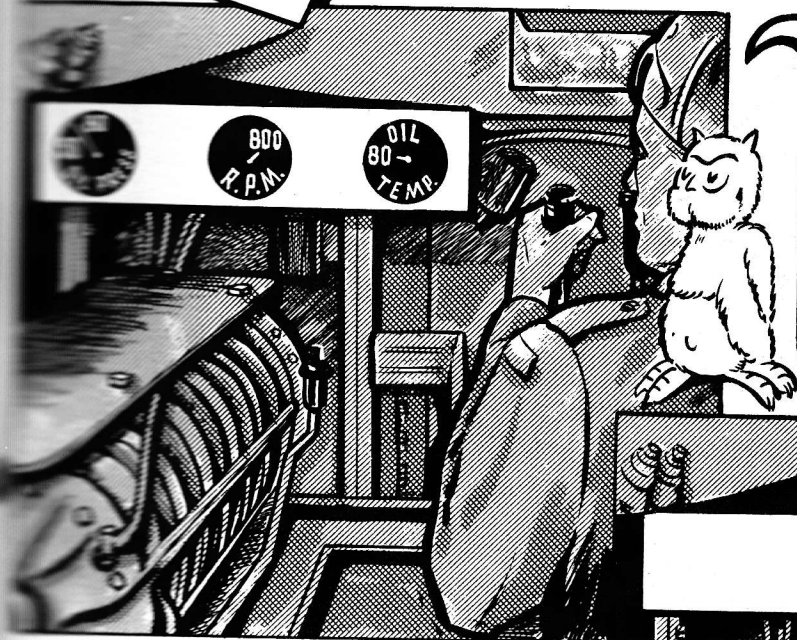
IT'S THE LATEST WORD

IT LAYS BARE THE FACTS

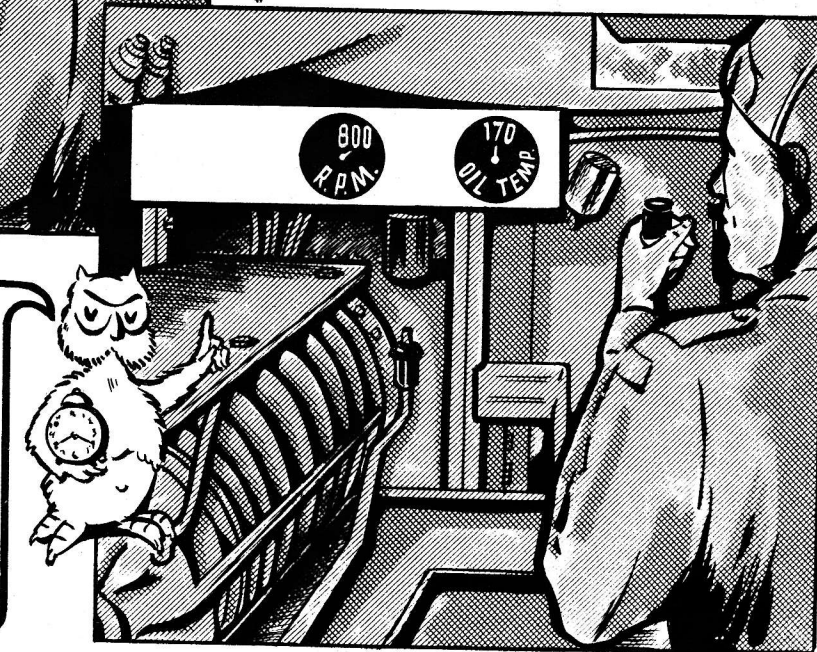
A complete exposé that every radial engine tank driver must know to properly carry out these operations.

Stories from the
new bulletin ...
A moving drama,
in two acts, that
will fire your imagi-
nation chamber and
should leave a last-
ing compression.

When the engine has been started keep it idling at 800 r.p.m. until the oil pressure reaches between 50 and 80 pounds and the oil temperature has reached at least 80°F. Then run up to 1000 r.p.m. If the oil pressure drops off, throttle back to 800 r.p.m. for additional warm up.



Before stopping the Engine, adjust the throttle so that the engine idles at 800 r.p.m. This will allow it to cool off slowly and prevent distortion of the parts due to unequal contraction. Idle from 5 to 15 minutes at least, depending on whether the engine temperature is normal or low.





OVER 20,000

Gas casualties last year

It's a sad fact but in the Army alone, over 3,000 motor vehicle accidents occurred in the past 12 months; many soldiers being injured fatally.

Quite apart from the cost in dollars and cents of the toll (and it amounts to a pretty penny) it's another sad fact that most of these accidents were avoidable. Speed, carelessness or recklessness was the prime cause of over 90% of this casualty list.

Just remember every accident hurts you and helps the enemy.

SOME INHALED IT! A FEW LIT IT! BUT MOST OF THEM STEPPED ON IT!